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PATENT APPLICATION

ATTORNEY DOCKET NO. 200310621-1

SEP 18 2007

INVENTOR(S): David C. Collins

Application No.: 10/678,475

Filing Date: October 3, 2003

Confirmation No.: 3351

Examiner: Marc A. Patterson

Group Art Unit: 1772

**Title: USES OF SUPPORT MATERIAL IN SOLID FREEFORM FABRICATION SYSTEMS**

Mail Stop Appeal Brief-Patents  
 Commissioner For Patents  
 PO Box 1450  
 Alexandria, VA 22313-1450

**TRANSMITTAL OF APPEAL BRIEF**

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on July 19, 2007.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) \$500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

(a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:

1st Month  
\$120

2nd Month  
\$450

3rd Month  
\$1020

4th Month  
\$1590

The extension fee has already been filed in this application.

(b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account 08-2025 the sum of \$ 500. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees.

A duplicate copy of this transmittal letter is enclosed.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to:  
 Commissioner for Patents, Alexandria, VA 22313-1450

Date of Deposit: 09/14/2007

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I hereby certify that this paper is being transmitted to the Patent and Trademark Office facsimile number (571)273-8300.

Date of facsimile:

Typed Name:

Signature: Brenda Wieseman

Respectfully submitted,

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By

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APPEAL BRIEF  
DOCKET NO. 200310621-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPELLANT:	David C. Collins
SERIAL NO:	10/678,475
FILED:	October 3, 2003
FOR:	USES OF SUPPORT MATERIAL IN SOLID FREEFORM FABRICATION SYSTEMS
ART UNIT:	1772
EXAMINER:	Marc A. Patterson
DOCKET NO.:	200310621-1

**CERTIFICATE OF MAILING**  
**UNDER 37 C.F.R. § 1.8**

DATE OF DEPOSIT: September 14, 2007

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being deposited with the United States Postal Service under 37 C.F.R. § 1.8 on the date indicated above and is addressed to: Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313.

*Brenda Wiseman*  
Brenda Wiseman

**APPELLANTS' APPEAL BRIEF UNDER 37 C.F.R. § 41.37**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450  
Mail Stop Appeal Brief – Patents

Dear Sir:

Appellants submit this appeal brief in connection with their appeal from the final rejection of the Patent Office, mailed May 31, 2007, in the above-identified application. A Notice of Appeal was filed on July 19, 2007.

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I. REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

## **II. RELATED APPEALS AND INTERFERENCES**

Appellants and Appellants' legal representatives know of no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**III. STATUS OF CLAIMS**

Claims 1-10 remain pending. Claims 11-20 have been withdrawn from consideration.

Thus, the claims on appeal in this application are claims 1-10, which constitute all of the claims presently pending for consideration.

**IV. STATUS OF AMENDMENTS**

No amendments to pending claims 1-10 have been made since the office action mailed on May 31, 2007, which was the final rejection of the pending claims.

V. SUMMARY OF CLAIMED SUBJECT MATTER

1. (previously presented) A solid freeform fabrication system for producing a three-dimensional object with embedded features (p. 2, ln. 14-15; p. 4, ln. 4-10; p. 6, ln. 29-30; FIG. 1a-1h, 2, 4), comprising:

build material configured to be deposited in layers to form a three-dimensional object (p. 2, ln. 15-16; p. 4, ln. 19-26; p. 6, ln. 30 – p. 7, ln. 1, p. 7, ln. 26 – p. 8, ln. 15, p. 9, ln. 1-5; p. 9, ln. 12 – p. 10, ln. 16; Elements 14, 14a – 14g generally in Figures); and

support material configured to be deposited adjacent to the build material for supporting the build material during formation of the three-dimensional object, said support material also being configured to form a feature that imparts a predetermined property, other than support, within the three-dimensional object (p. 2, ln. 17-20; p. 4, ln. 27 – p. 5, ln. 8, p. 7, ln. 1-5; p. 7, ln. 26 – p. 8, ln. 15, p. 9, ln. 1 – p. 10, ln. 30; p. 12, ln. 16-24; p. 13, ln. 4-9; Elements 16, 16a-16g generally in Figures).

In summary, the invention claimed in independent claim 1 provides for a solid freeform fabrication system for producing a three-dimensional object with embedded features (p. 2, ln. 14-15; p. 4, ln. 4-10; p. 6, ln. 29-30; FIG. 1a-1h, 2, 4). The system includes build material and support material (exemplary: p. 2, ln. 14-20; p. 4, ln. 4 – p. 5, ln. 8). The build material is configured to be deposited in layers to form the object (p. 7, ln. 26 – p. 8, ln. 28; p. 9, ln. 1-10). The support material is configured for supporting the build material during formation of the object (p. 2, ln. 14-18; p. 4, ln. 27-29; p. 7, ln. 1-3; p. 8, ln. 14-15; p. 9, ln. 14-15; p. 13, ln. 6-9; Elements 16a – 16e of Figures). Also, the support material is configured to form a feature that

imparts a predetermined property, beyond support, within the three-dimensional object (p. 2, ln. 19-20; p. 5, ln. 5-8; p. 7, ln. 3-5; p. 9, ln. 15-20; p. 12, ln. 16-30; p. 13, ln. 4-6). Support material is configured to be deposited adjacent to the build material (p. 2, ln. 14-18; p. 4, ln. 27-29; p. 7, ln. 1-3).

VI. GROUNDΣ OF REJECTION TO BE REVIEWED ON APPEAL

The issue presented for review is: whether claims 1-10 are unpatentable under 35 U.S.C. § 102(b) as being anticipated by Ryan et al (WO 98/21626, hereinafter “Ryan”).

It should be noted that the Final Office Action of May 31, 2007 includes conflicting information as to the state of the outstanding rejection. In one location, the Final Office Action indicated that the rejection of claims 1-10 under 35 U.S.C. § 102(b) as being anticipated by Ryan was withdrawn. See page 2, paragraph 2. The withdrawn statement is located under a “REPEATED REJECTIONS” heading; however, the answers to applicant’s arguments text appears to maintain the rejection. As such, the noted rejection is addressed herein.

## VII. ARGUMENT

### A. Prosecution History

The present application was filed on October 3, 2003, as U.S. Patent Application Serial No. 10/678,475, entitled USES OF SUPPORT MATERIAL IN SOLID FREEFORM FABRICATION SYSTEMS. The present application was filed as an original utility application.

In the first Office Action mailed March 8, 2006, the Examiner noted objected to the specification because of an alleged aspect of claim 6 not appearing to be disclosed in the specification. The Examiner also rejected claim 6 under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement. Additionally, the Examiner rejected claims 1-10 under 35 U.S.C. § 102(b) as allegedly anticipated by Ryan et al (WO 98/21626, hereinafter “Ryan”).

In a reply submitted by the Appellant on June 8, 2006, the Appellant amended paragraph [0035] of the specification, and amended claim 1 to include “other than support” regarding the support material. The amendment to the specification was to explicitly disclose the subject matter of claim 6, and as such, addressed both the objection to the specification and the rejection of claim 6 based on 35 U.S.C. § 112. In the same response, the Appellant respectfully disagreed with the reasons for rejection based on 35 U.S.C. § 102, specifically in light of the clarifying amendment. The Appellant further noted that claims 11-20 had not been reviewed or addressed by the Office Action.

On June 22, 2006, a Notice of Non-Compliant Amendment was mailed noting the amendment to the specification did not include appropriate markings. The Appellant replied on July 21, 2006 with an amended response, correcting the noted deficiency.

In a non-final Office Action dated November 28, 2006, the Examiner included a restriction requirement. Invention I included claims 1-10, and Invention II included claims 11-20. The Examiner also noted that in a telephone conversation with Mr. W. Bradley Haymond on March 1, 2006, a provisional election was made with traverse to Invention I, claims 1-10. Affirmation of the election was requested. The Examiner further maintained the objection to the specification, the rejection of claim 6 under 35 U.S.C. § 112, and the rejection of claims 1-10 under 35 U.S.C. § 102(b) as allegedly anticipated by Ryan.

In a response and amendment submitted by the Appellant on February 28, 2007, the Appellant again amended paragraph [0035] of the specification. The election of claims 1-10 was affirmed. The Appellant argued that the current state of the specification properly addressed the objection to the specification and the rejection of claim 6 based on 35 U.S.C. § 112. The Appellant, once again, respectfully disagreed with the reasons for rejection based on 35 U.S.C. § 102.

In response to the amendment and response submitted by the Appellant, the Examiner issued a Final Office Action rejection on May 31, 2007. In the Final Office Action, the Examiner did not address the objection to the specification. As such, Appellant believes the objection to be removed. The Examiner also withdrew the rejection of claim 6 based on 35 U.S.C. § 112. The Final Office Action explicitly stated that the rejection of claims 1-10 as being allegedly anticipated by Ryan had been withdrawn. However, the related context of the Office Action (i.e. Final Office Action with no rejections, headings, response to arguments) indicates that the rejection may not be properly withdrawn. After receiving the Final Office Action rejection, Appellant decided it would be beneficial to appeal the present claims so that a neutral third party

could decide these issues. Appellant filed a Notice of Appeal on July 19, 2007.

The shortcomings of the rejections will now be reviewed. Arguments and statements by Appellant made earlier but not repeated here are also part of the record for this appeal and are not waived; although they may be modified or supplemented herein. To keep this brief short while still trying to provide an adequate basis for review, some observations and arguments that might have been presented are not included. Accordingly, Appellants' silence herein with respect to particular statements by the United States Patent and Trademark Office does not indicate their agreement with or acquiescence thereto.

B. Appellants' Invention

As evidenced by the art of record, various aspects of freeform fabrication systems and methods are known. What Appellants have invented, and set forth in the claims, is a system that includes support material configured to support build material and to impart a predetermined property other than support within the three-dimensional object. Specifically, the present invention, as recited in claim 1, requires "support material configured to be deposited adjacent to the build material for supporting the build material during formation of the three-dimensional object, said support material also being configured to form a feature that imparts a predetermined property, other than support, within the three-dimensional object."

The system claimed includes build material configured for deposition in layers and support material. The specification discusses support material being "configured to be deposited adjacent to the build material for supporting the build material during formation of the three-dimensional object." See pg. 7, ln. 1-3. Support material, then, can provide support for additional layers of build material as well as support for the adjacent laterally-arranged build

material. In the sentence immediately following, the specification reads “[t]he support material can *also* be configured to form a feature that imparts a predetermined property within the three-dimensional object...” See pg. 7, ln. 3-5, emphasis added. The specification, as written, notes that the support material is multi-functional: it provides support and provides an additional property. Additionally, the support provided indicates both support for additional layer deposition as well as support to adjacent and laterally-situated build material, i.e. as a retention function where needed. Non-limiting examples of predetermined properties that a support material can provide include such things as color, including multiple colors, symbols; and conductivity. Support material configured to provide only support can be configured for removal after completion of full or partial fabrication of the three-dimensional object. Support material configured to provide both support and an additional property remains as part of the three-dimensional object.

To Appellants’ knowledge, they were the first to form a solid freeform fabrication system for producing a three-dimensional object with embedded features by including a build material and a support material, where the support material provides both support and a feature that imparts a predetermined property to the object, as outlined in the claims.

### C. The Ryan Reference

Ryan teaches a composite multifunctional microstructure that includes a layer of relief forming material and a functionalizing material. See Abstract. The reference teaches a first, optionally dispensable, layer; contacting at least a portion of the surface with a precursor of targeted growth functionalizing material, which the Examiner compares to the build material of the present application; providing a second layer of a relief forming polymer over the receptive

surface, which the Examiner compares to the support material of the present application; providing a plurality of relief features formed in the second layer to provide at least one retaining feature; and contacting with a growth medium in a manner to provide a third layer of non-polymeric functionalizing material “contained within” and lining, at least partially, the retaining feature or features. See p. 18, ln. 15-25.

The Ryan reference notes that the relief forming polymer material forms the second and sometimes first layers. Most references to the use of the relief forming polymer are in use to form relief structures wherein a build material can be placed or applied. Ryan then presents a third layer, which the Examiner compares to the build material of the present invention. In Ryan, the third layer material is often referred to as functionalizing material.

In essence, Ryan teaches a relief polymer that can form one or more relief features, and a functionalizing material that is deposited to line or partially fill the walls of the relief feature. The deposition of the functionalizing material is entirely dependent on the relief features in that the functionalizing material takes the form of a coating or partial coating of the walls of the relief features, or it is deposited to at least partially fill the relief features. The functionalizing material can be deposited as a precursor with a catalyst that lines the retaining features and is then subject to growth by means such as electroless deposition. See p. 10, ln. 3-8. The Examiner has argued and maintains that Ryan teaches retention of a material akin to the build material of the present invention, and further that retention is a property different from support.

The Examiner has previously argued that Ryan taught a material akin to the support material of the preset application that imparted color and conductivity. In responses to the Office Actions, the Appellant pointed out that the Ryan did not, in fact, teach a support-type material

which imparted either color or conductivity. By the Final Office Action mailed May 31, 2007, it appears the Examiner has removed such assertions, and continues to erroneously maintain that the only "predetermined property other than support" taught by Ryan is retention.

D. Rejection Under 35 U.S.C. § 102(b) over Ryan

The Examiner rejected claims 1-10 as being allegedly anticipated by Ryan under 35 U.S.C. § 102(b). The PTO, through the Examiner, has the burden of establishing anticipation. Appellant contends that the Examiner has not met its burden of establishing anticipation for lack of teaching every element of the present invention by the noted reference.

Before discussing the rejection based on anticipation, it is thought proper to briefly state what is required to sustain such a rejection. It is well settled that "[a] claim is anticipated only if each and every element as set forth in the claims is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil of California*, 814 F.2d 628, 2 U.S.P.Q. 2d 1051, 1053 (Fed. Cir. 1987). In order to establish anticipation under 35 U.S.C. 102, all elements of the claim must be found in a single reference. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 231 U.S.P.Q. 81, 90 (Fed. Cir. 1986), *cert. denied* 107 S.Ct. 1606 (1987). In particular, as pointed out by the court in *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1981), *cert denied*, 469 U.S. 851 (1984), "anticipation requires that each and every element of the claimed invention be disclosed in a prior art reference." "The identical invention must be shown in as complete detail as is contained in the...claim." *Richardson v. Suzuki Motor Co.* 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1989).

With this brief background in mind, Appellants contend that the Patent Office has failed to meet its burden of establishing anticipation with Ryan. Specifically, the Office has failed to

show that the cited reference teaches each and every element of the present claims. Ryan does not teach all of the elements of claim 1. Ryan does not teach a support material configured to impart a predetermined property other than support, nor does it teach a build material configured to be deposited in layers.

The present invention, according to claim 1, requires “support material configured to be deposited adjacent to the build material for supporting the build material during formation of the three-dimensional object, said support material also being configured to form a feature that imparts a predetermined property, other than support, within the three-dimensional object.” The Examiner relates a layer of relief forming polymer of Ryan to the presently claimed support material and further notes that the relief forming polymer “imparts a predetermined property of retention, which is a property other than support...”

The Appellant disagree with the Examiner’s assessment that retention is not support. Retention is, in fact, support, as used in the context of the present application. The support material of the present application provides support for subsequent build material, deposited in layers, as well as laterally-arranged build material, as needed. In this manner, the usage of support is consistent with plain meaning. The Examiner argues that Ryan teaches that without the relief features, there would be no retention, although there would clearly be support because one layer would be positioned on top of another, and thus, Ryan allegedly does not consider retention to be the same as support. See Final Office Action of May 31, 2007, p. 2, para. 5. Such distinction is unnecessary. Support, as generally used, can be applied in a variety of directions, as with the present application: support can be in a vertical and horizontal manner. The support of the present application is, as needed, in both a vertical manner (i.e. supporting layers deposited

on top of the support material), and in a horizontal manner (i.e. supporting adjacently-situated build material). Therefore, retention is not a predetermined property other than support, as required by the present claims, but retention is a support function. To reiterate, retention being support is consistent with the presently filed application. The specification discusses support material being “configured to be deposited adjacent to the build material for supporting the build material during formation of the three-dimensional object.” p. 7, ln. 1-3. Depositing support material adjacent to the build material would certainly provide a retaining feature or function. In the sentence immediately following, the specification reads “[t]he support material can *also* be configured to form a feature that imparts a predetermined property within the three-dimensional object...” p. 7, ln. 3-5, emphasis added. It is clear from the specification, and would likewise be clear to one of ordinary skill in the art that, in the context of use of support materials, providing retention is a form of providing support. As such, Ryan does not teach a support material that provides support and a predetermined feature other than support, and thus does not teach each and every element of the presently claimed invention.

Additionally, Ryan does not teach a build material configured to be deposited in layers to form a three-dimensional object. The Examiner relates the build material of the present invention to the functionalizing material of Ryan. The functionalizing material, as noted by the Examiner, can be deposited to substantially fill a channel. More specifically, Ryan teaches that the structure can be made by lining the walls and base of channels first with a catalyst. Then, functionalizing material can be deposited by electroless deposition or electroplating to cause the functionalizing material to substantially fill the channels. Ryan p. 23, ln. 16-23. Filling channels, as taught in Ryan, does not teach, expressly or inherently, depositing material in layers.

More importantly, the methods utilized in Ryan indicate that the functionalizing material is not configured for deposition in layers to form a three-dimensional object, as taught by the present application. Essentially in Ryan, the channels are formed to provide retaining features wherein the functionalizing material can be deposited to a limit where it substantially fills the channel. This type of processing does not teach a build material configured to be deposited in layers to form a three-dimensional object. The Examiner argues the deposition of material in Ryan “creates a thickness of material, having a defined width” and thus teaches deposition by layers. See Final Office Action of May 31, 2007, p. 3, para. 1. However, such material is not configured for deposition in layers. A material requiring retention, as in Ryan, is, by definition, not configured for deposition in layers. Furthermore, where the functionalizing material of Ryan requires relief features of the alleged support material before deposition, the alleged support material is then not configured to be deposited adjacent to the build material, as required by present claim 1.

Thus, Ryan does not teach all of the elements of claim 1. The support material of the present invention must offer an additional feature other than mere support when being utilized for that purpose. The support material cited by the Examiner in the Ryan reference offers support only, even retention as a support function. Furthermore, Ryan does not teach a build material configured to be deposited in layers to form a three-dimensional object. Consequently, Appellant requests removal of this rejection.

E. Conclusion

In conclusion, Appellants respectfully submit that the claims on appeal set forth in the Appendix are patentably distinct from the asserted prior art reference. Particularly, Ryan fails to teach each and every element of the present claims, within the meaning of 35 U.S.C. §§ 102.

Since the Patent Office has not met its initial burden of establishing that the claims lack novelty or that the claims are *prima facie* obvious, Appellants respectfully submit that all remaining rejections are improper, and should be overturned.

Dated this 14<sup>th</sup> day of September, 2007.



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## VIII. CLAIMS APPENDIX

1. (previously presented) A solid freeform fabrication system for producing a three-dimensional object with embedded features, comprising:
  - build material configured to be deposited in layers to form a three-dimensional object;
  - and
  - support material configured to be deposited adjacent to the build material for supporting the build material during formation of the three-dimensional object, said support material also being configured to form a feature that imparts a predetermined property, other than support, within the three-dimensional object.
2. (original) A system as in claim 1, wherein the build material is a liquid that is configured to be deposited in layers using an ink-jet printhead.
3. (original) A system as in claim 2, wherein the build material is UV curable.
4. (original) A system as in claim 1, wherein the feature is within a cavity defined at least in part by the build material.
5. (original) A system as in claim 4, wherein the cavity is a closed cavity that is completely defined by build material.

6. (original) A system as in claim 4, wherein the cavity is an open cavity that is partially defined by the build material and is partially open to a surface of the three-dimensional object.

7. (original) A system as in claim 1, where the feature imparts color.

8. (original) A system as in claim 1, where the feature imparts conductance.

9. (original) A system as in claim 7, wherein the build material is at least partially transparent.

10. (original) A system as in claim 8, wherein the feature also includes additional build material.

11. (withdrawn) A method for solid freeform fabrication of three-dimensional objects, comprising:

layering build material to form a three-dimensional object, said three-dimensional object including a cavity therein that is at least in part defined by the build material;

supporting overhangs formed during the layering step using a first portion of support material;

depositing a second portion of the support material in said cavity, wherein at least the second portion of the support material is configured to form a feature that imparts a predetermined property, other than support, within the three-dimensional object; and

removing the first portion of the support material from the three-dimensional object.

12. (withdrawn) A method as in claim 11, wherein the step of layering includes step of jetting build material to form multiple layers of build material.

13. (withdrawn) A method as in claim 12, further comprising the step of UV curing the build material after the jetting step.

14. (withdrawn) A method as in claim 11, wherein the first portion and the second portion of the support material are of the same composition.

15. (withdrawn) A method as in claim 11, further including the step of depositing build material within the cavity.

16. (withdrawn) A method as in claim 15, wherein the build material is at least partially transparent, the support material imparts a color, and the build material and the support material are both present within the cavity at a 1:99 to 99:1 build material to support material volume ratio.

17. (withdrawn) A method as in claim 11, where the feature imparts color.

18. (withdrawn) A method as in claim 11, where the feature imparts conductance.

19. (withdrawn) A method as in claim 11, further comprising the preliminary step of predetermining the location to place cavities within the three-dimensional object.

20. (withdrawn) A method as in claim 19, wherein the step of predetermining is carried out with the assistance of a computer modeling system.

**IX. EVIDENCE APPENDIX**

(No matter presented)

X. RELATED PROCEEDINGS APPENDIX

(No matter presented)